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The Meeting on Energy Conservation
in Small and Medium Industries

Kuala Lumpur, Malaysia, 1-2 December 1983

REPORT*

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1.0 INTRODUCTION

1. The Meeting on Energy Conservation in Small and Medium Industries was convened in Kuala Lumpur, Malaysia on 1st - 2nd December, 1983. The Meeting was officially opened by Mr. Nik Ahmad bin Haji Nik Hassan, Secretary General of The Ministry of Energy, Telecommunication and Posts.

The Meeting was attended by delegates as listed in Annex I.

2.0 ELECTION OF CHAIRMAN

Mr. Syed Mohd. Adlan of the Ministry of Energy, Telecommunication and Posts, Malaysia was elected Chairman of the meeting.

3.0 PRESENTATION OF THE REPORT ON THE SURVEY ON THE ASEAN ENERGY-CONSERVATION PROJECT IN MALAYSIA

The Chairman invited the Project Team to present the findings of the Survey on Energy Conservation in Selected Small and Medium Industries In Malaysia.

The presentation was divided into 3 parts in which the introduction and general aspect of the report was presented by Mr. Masataka Eguchi. Mr. Ryoki Takahashi presented the thermal section while Mr. Toshio Sugimoto spoke on the electrical section of the report.

The Meeting took note of the various findings by the Project Team.

4.0 DISCUSSION ON ENERGY CONSERVATION MEASURES BY THE FACTORIES

The factory representatives then presented their comments as follows:

MARCO SHOES SDN. BHD.,

The representative from Marco Shoes Sdn. Bhd., reported that following the audit by the Project Team, the Factory Energy Conservation Committee had decided to await the final recommendations of the Report from the Project Team before investing funds into energy

conservation measures. In other areas where conservations measures involved house-keeping activities in the factory, the management had initiated action to resolve the problem areas.

The representative mentioned that he had requested for information on more sensitive thermocouple for the autoclave which could be recommend by the Project Team, as the present thermocouples have been found to be not sufficiently sensitive.

In response to the Project Team's recommendation to switch thermocouples between the 2 autoclaves in the factory, the representative informed that this was not possible as the two thermocouples were of different sizes. Regarding the insulation for feed water tank and the drain recovery pipe, he said that insulations on these will be added in June, 1984 when the factory closed down for maintenance.

USMETA SDN. BHD.

The representative from Usmeta Sdn. Bhd., asked the Project Team if there are ways to reduce their energy bills which now amounted to \$6,000 - \$12,000 per month to retread 3,000 tyres.

The Project Team commented that the factory's steam traps could be faulty as the temperature of water in heat recovery system was 100°C instead of the normal 70 - 80°C. Further, the boiler produced 10 times more steam than is required by the factory. By repairing/replacing the faulty steam traps, the Project Team felt that this factory could save 20 - 30% of their fuel costs.

The Malaysian Counterpart further commented on the reliability of the steam traps and suggested that Usmeta Sdn. Bhd., could seek assistance from the Malaysian Counterparts.

The factory representative replied that even in spite of having replaced all the steam traps and having insulated all their pipes, there had been no significant savings in their energy bill. The

Japanese Project Team suggested that the Factory could switch from present open system of heat recovery to the closed system, that is by using a pressure tank.

The Malaysian Counterpart added that another alternative to cut fuel costs would be to change to a smaller boiler. In regard to this, a delegate said that this would not be necessary as steam output could be adjusted by controlling the rate of boiler firing.

SOUTH EAST ASIA FIREBRICKS INDUSTRIES

The representative informed the meeting that during the time of the Project Team visit in April, the factory had requested that the team concentrate its study on the smallest of its 3 kilns. The factory felt that this kiln had not been very efficient in fuel consumption. The factory had also requested that Project Team to study the feasibility of using the waste heat from the stack of this particular kiln as the waste heat from the stacks of the other 2 kilns have been already used for preheating.

This representative also informed the meeting that it did not have any indicating instrument to help them to reduce the oxygen contents of the flue gas. In response, the Project Team said that this could be done by visual means and there was no need for any instruments. With experience, the factory could adjust the oxygen content of the boiler feed air. If the smoke from the chimney is dark, this showed that there was insufficient oxygen for combustion. On the other hand if the smoke is clear, it indicates sufficient oxygen to the boiler for combustion but this could also result in loss of heat from the flue gas.

GENERAL CERAMICS MANUFACTURERS SDN. BHD.

The Factory representative informed that although the internal wall of their tunnel kiln had been lined with aluminium blankets, the factory still spent about \$125,000 per month on fuel. This amounted to about 25% of the factory's operating costs. The representative requested the Project Team to suggest proper insulating methods and the costs involved.

The Project Team responded that the factory should consider having insulation on the external walls of the kiln and rockwool was suggested as a suitable material. It was also added that the factory could use waste heat from the flue gas to preheat air entering the combustion chamber.

The factory representative explained that by relining their ball millers, a saving of 20% on electricity consumption had been achieved. The factory representative further requested for advice on the feasibility of installing 2 transformers of 500 KVA capacity in the factory. To this the Malaysian Project Team replied that the electricity load had to be known first before they could make any comments.

MALAYA INDUSTRIAL AND MINING CORPORATION

The representative of Malaysian Industrial and Mining Corporation made some comments which were based on the findings of the Project Team. The Project Team had reported that the voltage level in the factory was too high. However, according to the factory records the voltage very often dropped to as low as 380 volts and was responsible for the motors burning out. Although the motors was found to be undersized for many of the factory's requirements, the factory management considered the cost of a new motors prohibitive. The factory would be setting up its own power station in the process of expansion and hoped to rectify the voltage problem.

Following the recommendation of the Project Team, the factory had switched some of their fluorescent lamps to mercury lamps but found that their electricity costs much higher. Moreover, the large amount of cement dust corroded the mercury lamp and shortened the lifetime.

The representative further added that the factory was considering changing the firing gun in the kiln, as the oxygen level was too low in the kilns. An additional blower has been installed

in the kiln but an accurate picture of the effects on the consumption of fuel oil could only be obtained in one or two years time. The representative also felt that with the plant running continuously and shutting down a costly affair, the factory management would consider brick lining only when it is forced to cease operations following a major breakdown.

He added that it would be difficult to form an Energy-Saving Committee as most of the factory workers are illiterate and training will require considerable time. The door of the kiln is sometimes kept open to prevent over-heating of the clinker.

The Project Team in turn responded that to avoid the motor burning out, it should not be run at full load. The motor could be run at a maximum of 90% of the rated voltage. The mercury lamps were recommended as a safety measure for the workers and not for economic reasons, and the rise in the electricity bill was anticipated.

The Project Team did not recommend installation of an additional blower. However it recommended the control of combustion be improved at the rotary dryer.

The Project Team also recommended that the heat from the cooling chamber be recovered and used to preheat the fuel oil to a temperature above 30°C. The fuel oil could then be heated to 100°C by using the electrical heater. Waste heat recovered by this method could save about \$60,000 per annum.

CHEMPAKA NEGERI LAKSHIMI TEXTILE SDN. BHD.

The representative from Chempaka Negeri Lakshimi Textile Sdn. Bhd., informed the Meeting that the factory was now operating at maximum capacity and at 1867 Amps which exceeded the transformer rating of 1666 Amps. In this context the representative inquired whether the Project Team would still recommend the use of one transformer.

The representative sought advice on the recommendation to reduce maximum demand load and utilizing maximum load alarm indicator. Advice was also required on the means to decreasing the air-conditioning load by relocating the heat dissipating equipments such as compressors and capacitors.

The Project Team's responded that two smaller transformers could be used but it was still possible to use one of the existing transformers by adjusting the voltage.

It suggested that an 'indicator system' could be installed together with redistribution of load. With regard to reducing the airconditioning load, the Project Team felt that an absorption type of air-conditioner could be installed together with a microprocessor so that the maximum level of air-conditioner load can be automatically controlled.

FUSAN FISHING NET MANUFACTURING BHD

The factory representative reported that energy costs amounted to about 10% of total operation costs, out of which 9% was for electricity and the other 1% for fuel oil. This worked out to be about \$70,000 on electricity and about \$10,000 on fuel oil per month.

Whenever possible the factory had implemented some of the recommendations made by the Project Team. The factory had borrowed an oxygen meter from NEB and undertook the necessary adjustment on the boilers as recommended by the Project Team. However this had not been effective and till of date there had been no significant savings.

The factory inquired of the Project Team as to the reason of using 0.5 as the value of the diversity factor in calculating the power consumed. The Project Team replied that it was assumed that 50% of the heater was off most of the time.

The factory representative also pointed out that the raw material used was polyethylene and not polyester as mentioned in the report. The Project Team during its visit to the factory noted that the water in the boiler and also the boiler blow down water were not as clean as it should be. Following the recommendations to improve this, the factory cleans the boiler once a month on the fire side and one in 3 months on the water side.

The Project Team had noted that steam was being used in both the dyeing and stretching processes and of the two, the stretching process offered very good potential for savings. In this respect, the factory representative sought more information on the steam accumulator as recommended in the report. According to their calculations, the steam accumulator to be incorporated into their present system will have to be very large to provide for the steam requirement of the factory. Both the factory and the Project Team agreed to resolve this outside the meeting proper.

Touching on points raised by the factory representative on the boiler and steam accumulator, the Project Team stated that under normal circumstances, there is a necessity to blow down the boiler because a situation where there is a high concentration of chemicals in the boiler water would cause deterioration of the boiler. A simple way to decide when to have a blow down is to check the pH value and the conductivity of the boiler water with the value recommended by the boiler chemical manufacturer. It was also explained that steam accumulators have been widely used in Felda palm oil refineries and are known as back pressure vessels.

The capacitor used in this factory was also over powered. Change into a more appropriately rated capacity could result in some savings.

The representative concluded that the factory, since implementing some of the recommendations had recorded savings of 20% on its energy bill.

KIMA SDN. BHD.

The factory representative elaborated on the recommendations made by the Project Team and raised some issues which the factory will have to consider before implementing these recommendations.

According to the Project Team, the factory could save about \$12,000 per year on electricity costs if 3 of the existing transformers are shut down. However, this would require an investment of about \$70,000 for rewiring and to modify the switch rooms and switch boards. The factory was rather reluctant to undertake this considering that the payback period would be 6 years.

Similarly the factory was also reluctant to install fuel oil and water meters to monitor boiler efficiency and to increase the factory lighting to brighter level as these required very big investments. As the cost estimates amounting to about \$200,000 may be required to implement all the recommendations given by the Project Team, the factory was now compiling all the proposals into a report to be brought to the attention of the Factory Management. In the mean time certain sections of the factory was now being studied by a Japanese Government Aid team for possible modifications to diversify the products.

GOH BAN HUAT POTTERY WORKS SDN. BHD.

After expressing his thanks to the relevant parties, the factory representative informed the meeting that his factory had carried out some of the recommendations made by the Project Team while some recommendations will be implemented after studying the official report.

The factory have tried reducing the oxygen content of the flue gas from 10% to 5%. This however was found to have an effect on the quality of the finished products. Under this situation, the Project Team agreed that it will not be advisable to reduce the oxygen content of

the combustion air. The factory was also redesigning its dryer as it was found to be not satisfactory.

In the meantime the factory has reduced the heating cycle from 36 hours to 32 hours.

5.0 CONSIDERATION OF PROPOSAL ON FRAMEWORK OF
MALAYSIAN ENERGY CONSERVATION CENTRE

Mr. Kenji Kondo, on behalf of the Ministry of International Trade and Industry (MITI) and the Japanese Government, presented a paper on 'Energy Conservation Project in Malaysia'. He stressed that the Malaysian enterprises should make full use of the findings of the field survey.

Mr. Eguichi presented a paper on 'A study on establishment of Energy Conservation Centre of Malaysia'. He further elaborated on the typical Japanese Energy Conservation set up of factory level which normally functioned as follows:-

The Head Office decides on policy issues, including company target e.g. energy consumption must be reduced by 10%, which is relayed to a Committee. The Committee in turn will inform the factory manager. Within a factory, number of small groups of 3 - 5 persons exist which are headed by the foreman. Then factory manager will direct the small groups to think of ways and means to achieve the target of 10% reduction in energy consumption. Small groups then report back to the factory manager who will then report to the Committee for decision.

6.0 DISCUSSION ON NATIONAL ENERGY CONSERVATION PROGRAMME
THROUGH APPROPRIATE MECHANISM AND INFRASTRUCTURE

The chairman invited the factory representatives to comment on the extent of which they have benefitted from the project and how the implementation of the project can be improved and whether such energy auditing be extended to other factories.

The factories generally were of the opinion that the project had been an eye opener particularly to the top management. Up to now most of the factories had given little if at all any emphasis to energy conservation, however through the factory-survey and its findings through the project team had shown them the importance of energy conservation and potential for reduction in their energy bills. One factory in particular remarked that if the recommendations were implemented in their factory, their energy bill would be reduced by 30% without much investment.

The factories hoped that the National Electricity Board counterparts would be willing to continue rendering their service in energy auditing and in advising the factories on the methods and techniques of implementing the recommendations in the report.

Two of the factories suggested the formation of a committee with its members consisting of the nine factory representatives and the National Electricity Board team members. This committee would look into the techniques required, solutions to their individual problems and exchange of experiences which could subsequently be disseminated for the benefit of the other factories.

One factory inquired whether the National Electricity Board project team could offer training programmes to factory engineers. The leader of the project team responded that it would be better if the factories approached their own organisations, for e.g. rubber, textile associations.

The UNIDO representative remarked that the objectives of the project was not to limit the benefits of energy management to only 9 factories but to ensure that the technology transfer from Japan to Malaysia would benefit all small and medium factories in Malaysia. It is hoped that the National Electricity Board will carry out such a field survey in other small and medium scale industries in the country.

It was also pointed out that the Field Survey Report after modification and adjustment together with the Guide Book will be disseminated to all the participants.

The Chairman remarked that the necessity of an energy conservation centre in Malaysia requires further study by the Malaysian authorities.

The leader of Malaysian Counterparts replied that while it is true that the technical knowhow and energy conservation equipment have been imparted to the local counterparts, the team would only conduct energy audits upon request from the factories. He added that the Ministry of Energy Telecommunications and Posts might want to liaise with the Federation of Malaysia Manufacturers to obtain names of factories interested in having an energy diagnosis carried out in their factories. The NEB project team will then consider extending the services.

The Chairman thanked all the participants for their useful contribution to the meeting and wished them success in their energy conservation efforts in future.

ANNEX I

LIST OF PARTICIPANTS

	Name	Designation
UNIDO	1. Dr. H.W. Pack	Senior Officer, P.O. Box 400, Vienna
Japanese Government Officials	2. Mr. Hidetoshi Hayakawa	Representative of the Japanese Government, MITI 1-3-1 Kasumigaseki Chiyoda-ku Tokyo
	3. Mr. Kenji Kondo	Representative of the Japanese Government, MITI 1-3-1 Kasumigaseki Chiyoda-ku Tokyo
Malaysian Government Officials	4. Mr. Mokhtar bin Yaacob	Deputy Secretary General Ministry of Energy, Telecommunications and Posts, Malaysia
	5. Mr. Syed Mohd. Adlan	Head of Energy Unit Ministry of Energy, Telecommunications and Posts, Malaysia
	6. Mr. Mohamed Annuar Shamsudin	Principal Assistant Secretary (Energy), Ministry of Energy, Telecommunications and Posts, Malaysia
Japanese Survey Team	7. Mr. Masataka Eguchi	Team leader Expert (energy management) 2-39-3 Nishihimbashi Minato-ku, Tokyo
	8. Mr. Ryoji Takahashi	Expert, (thermal) Energy Conservation of Japan, Shimbashi, Tokyo

	Name	Designation
	9. Mr. T. Sugimoto	Expert, (electrical) Energy Conservation of Japan, Shinbashi, Tokyo
Malaysian Counterparts	10. Dr. Ariff Araff	Senior Engineer, National Electricity Board, Malaysia
	11. Dr. Ong Peng Su	Engineer, National Electricity Board, Malaysia
	12. Mr. Ahmad Faizul Shamsuddin	Research Engineer, National Electricity Board, Malaysia
	13. Mr. Alizan Abdul Manan	Planning Engineer, Ministry of Energy, Telecommunications and Posts
Factory Representatives	14. Mr. A. Ganesan	Factory Manager, Marco Shoes Sdn. Bhd., Pandamaran, Pelabuhan Kelang
	15. Mr. Choo Kwok Chiang	Production Manager, Fusan Fishing Net Manufacturing Bhd., Jalan North Port, Pelabuhan Kelang
	16. Mr. Hew Foot Lin	Engineering Manager, KIMA Sdn. Bhd., P.O. Box 3, Kajang
	17. Mr. Ismail Mohd. Yassin	Production Executive, USMETA Sdn. Bhd., No.2 Lorong Enggang Empat, Kg. Datuk Keramat Tembaku, Kuala Lumpur
	18. Mr. M. Rajendran	Assistant Maintenance Engineer, Cempaka Negeri Laksmi Textile, Senawang Industrial Estate, Seremban, Negeri Sembilan

	Name	Designation
	19. Mr. Tan Boo Chin	Technical Engineer, South East Asia Firebricks Industries, Batu 8 ³ / ₄ , Jalan Ipoh, Kuala Lumpur
	20. Y.M. Tunku Abdul Muthalib bin Tunku Nong	Production Manager, General Ceramic Manufacture Sdn. Bhd., Lot 6, Jalan Bersatu, Petaling Jaya
	21. Mr. Chin Lip Kee	Technical Assistant, Malaya Industrial Mining Corp. Sdn. Bhd. Batu Caves, Selangor
	22. Mr. Vernon Perera	Plant Manager, Goh Ban Huat Pottery Works 238, Jalan Segambut, Kuala Lumpur
Observers	23. Mr. Abu Bakar Ismail	Head Energy Unit, Research Department PETRONAS, P.O. Box 2444, No. 136, Jalan Pudu, Kuala Lumpur
	24. Dr. G. Raju	Senior Planning Officer,
	25. Mr. Heoe Hock Fie	Engineer, Universiti Pertanian Malaysia, Serdang, Selangor
	26. Mr. Ismail bin Mustapha	Planning Engineer, Ministry of Energy, Telecommunications and Posts, Wisma Damansara, Kuala Lumpur
	27. Mr. Japri bin Ahmad	HICOM, Assistant Project Manager, Tingkat 6-9, Wisma Yeng Chong, P.O. Box 707, Jalan Puncak, Kuala Lumpur

Name	Designation
28. Ms. Margaret Chow	Economist, MIDA, Wisma Damansara, Jalan Semantan, Kuala Lumpur
29. Mr. Misron bin Yusof	Director, Sultan Ahmad Shah Training Institute, N.E.B. Bangi, Selangor
30. Dr. Mohamad Awang Lah	Engineering Faculty, University of Malaya, Jalan Pantai Baru, Kuala Lumpur
31. Dr. Mohamad Jamel Basha	Physics Research Centre, Universiti Sains Malaysia, Minden, Penang
32. Prof. Madya Muhamad Yahya	Head, Physics Department, Physics and Applied Science Faculty, Universiti Kebangsaan Malaysia, Bangi, Selangor.
33. Dr. Mustapha Yusoff	Senior Research Officer, SIRIM
34. Prof. Madya Omar Munir	Deputy Vice-Chancellor, Universiti Teknologi Malaysia Jalan Gurney, Kuala Lumpur

AGENDA

Thursday, 1st. December

- 8.30 am - 9.00 am - Registration of participants
- 9.00 am - 9.15 am - Participants to be seated
- 9.15 am - Arrival of The Secretary General, Ministry of Energy, Telecommunications and Posts, Malaysia
- 9.20 am - Welcome address by Deputy Secretary General, Ministry of Energy, Telecommunications and Posts, Malaysia
- Opening address by The Secretary General, Ministry of Energy, Telecommunications and Posts, Malaysia
- 9.45 am - 10.15 am - Refreshments
- 10.15 am - 10.20 am - Election of Chairman
- 10.20 am - 12.45 pm - Presentation of audit report by experts from Japan and Malaysia
- 12.45 pm - 2.00 pm - Lunch hosted by The Secretary General, Ministry of Energy, Telecommunications and Posts, Malaysia
- 2.00 pm - 3.15 pm - Report and discussion by factory representatives
- 3.15 pm - 3.30 pm - Refreshments
- 3.30 pm - 5.00 pm - Discussion continues

Friday, 2nd. December

- 9.00 am - 10.00 am - Discussion continues
- 10.00 am - 10.30 am - Refreshments
- 10.30 am - 11.30 am - Discussion continues
- 11.30 am - 12.45 pm - Presentation by Japanese experts on "Framework of Malaysian Energy Conservation Centre"
- 12.45 pm - 2.00 pm - Lunch
- 2.00 pm - 3.15 pm - Discussion on "National Energy Conservation Programme Through Appropriate Mechanism and Infrastructure"
- 3.15 pm - 3.30 pm - Refreshments
- 3.30 pm - 5.00 pm - Recommendations and conclusion

ANNEX III

LIST OF DOCUMENTS

1. Report on the survey on the ASEAN Energy-Conservation Project in Malaysia (UNIDO publication No: UNIDO/IS).
2. A study on establishment of Energy-Conservation Center of Malaysia (UNIDO publication No: UNIDO/IS).
3. Guide Book for the Factory Engineers on Energy Conservation Diagnosis (UNIDO publication No: UNIDO/IS).